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from those places where it is known to exist. If, after taking the preliminary steps, as described in a former part of this article, we should find, after the lapse of the necessary time, upon the trees experimented with, the characteristic holes in the scales which mark the exit of the chalcis, we should know that the friendly parasite had entered upon its work. If such an experiment could be conducted to a successful issue, it would furnish one of the most admirable instances on record, of the triumph of science, in its application to economic entomology.' "

In like manner the Hessian fly and wheat midge could, we believe, be kept within legitimate bounds, by the transportation from Europe of the parasites that in England and France are known to reduce their numbers materially. It would be an easy task to cause several bags of stubble containing the cocoons of these parasites to be sent over to this country, and reared here. So also the dreaded cabbage butterfly, our last European importation, can in new districts be kept under by transporting the Pteromalus or chalcis parasite, which in Essex county, Mass., is quite abundant. This rearing of ichneumon parasites can be carried on by intelligent gardeners and farmers in conjunction with an entomologist, and we look upon the future of ichneumon culture as one of the departments of a scientific, intelligent agriculture. Something should be done in the matter by the national department of agriculture, and instead of disseminating frightfully injurious insects in the seeds distributed from Washington, as is sometimes done through carelessness, it would be less harmful to scatter broadcast papers of ichneumon seed.

HABITS AND CHARACTERISTICS OF SWAINSON'S BUZZARD.

BY DR. ELLIOTT COUES, U. S. A

THIS large hawk is very abundant in northern Dakota, where it came under my observation almost daily during the summer of 1873. Excepting an occasional rough-leg or red-tail, it was the only buteonine species observed, and the only hawks more common were the ubiquitous marsh harriers and sparrow-hawks.

The species is thoroughly distinct from its nearest ally, *B. borealis;* it never gains the red tail, so characteristic of the latter, and differs in other points of coloration in its several stages of plumage, as noted beyond. Although its linear dimensions intergrade with those of the red-tail, it is not so heavy nor so large a bird, and its shape differs in some points. A tangible and very convenient distinction, to which my attention was first called by Mr. Ridgway, and which I have verified in numerous instances, is found in the emargination of the primaries. As stated in my late work (Key N. A. Birds, p. 217), Swainson's buzzard has only *three* emarginate primaries, while the red-tail has *four;* the fourth quill of the former, like the fifth of the latter, is variously sinuate-tapering, but never shows the decided nick or emargination of the inner web.

The following measurements, taken in the flesh, illustrate the sexual difference and other variations in size: Largest adult ♀ 22 inches long, 54 in extent, the wing 16; other females respectively 21·50×51·75×16·25. . . . 21·00×53·00×15·75. . . . 20·50×51·00×15·25. . . . 19·00×49·00×13·50; but this last one was an ungrown young. Adult ♂ 19·00 to 20·00 long, by about 49 00 in spread of wing, the latter 15·00 and a little more. In both sexes, and at all ages, the eye is brown, but of varying shade—I have seen no approach to a yellow iris. In the old birds the feet, together with the cere, gape, and base of under mandible are rich chrome yellow; the rest of the bill, and the claws, being bluish black. In the young of the year these yellow parts are much duller—grayish-yellow, or yellowish clay-color. Most of the old birds I have skinned had the integument of the lower belly largely bare, yellowish in color, hardened and thickened with warty excrescences; this disease seemed the rule rather than the exception. Unfledged nestlings are covered with white fluffy down; the first feathers to appear on the under parts show the characteristic color and markings of the formerly supposed species, "*B.Bairdii.*" (The various plumages are given beyond.) A moult occurs in August and September; it is protracted, the feathers being very gradually renewed, almost one by one; the fresh heavily colored feathers contrasting strongly with the ragged and faded ones worn during the summer. The young have no moult at this season, carrying the plumage in which they leave the nest into the winter. I have no observations upon a spring moult which probably occurs to both old and young. I took no specimens in the melanistic state of plumage in which the bird has been described as another supposed species—*B. insignatus;* and only saw one in which the entire under parts looked as dark, when the bird was sailing over me, as the pectoral band of the adults is. This dark plumage appears to be an individual peculiarity, not a normal stage of regular occurrence.

Swainson's buzzard may be seen anywhere in the region mentioned—even far out on the prairie, miles away from timber, circling over head, or perched on the bare ground. In alighting, it generally takes advantage of some little knoll commanding a view around, though it often has no more prominent place than the cart-load of dirt from a badger's hole, from which to cast about for some imprudent gopher* espied too far from home, or still more ignoble game. But the bird prefers timber, and, especially as its nesting is confined to trees, it is most frequently observed in the vicinity of the few wooded streams that diversify the boundless prairie. In northern Dakota such streams cut their tortuous way pretty deeply into the ground, and the sharp edges of the banks, rising steep on one side and on the other stretching away on a continuous level, are favorite resting spots, where sometimes a line of several birds may be observed strung along a distance of a few yards. The Souris or Mouse River, a stream of this description, is a favorite resort, where I found the birds more numerous than anywhere else. Much of the river bottom is well wooded with elm, oak and other large trees; and the number of nests found in this timber—sometimes several in sight of each other—would be considered surprising by one not recollecting that conveniences for breeding are in this country practically limited to such narrow tracts.

The nests are built at varying heights, from the intricacies of heavy shrubbery where a man may reach them from the ground, to the tops of the tallest trees. They are generally, however, placed thirty or forty feet high, in some stout crotch or on a horizontal fork. They are bulky and ragged looking structures, from the size of sticks used for the base and outside; the interior is composed of smaller twigs more compactly arranged. The shape varies with the requirements of the location, being more or less conical in an upright crotch, flatter on a fork. The interior hollowing is slight. An average external diameter may be given as two feet, and depth half as much. I was too late for eggs in the locality above mentioned; the only nest I found with anything in it contained two half-fledged young. This was on the 15th of August—so late as to induce the belief that perhaps two broods may be reared in a season, especially as before this date I had observed many full grown yearlings on the wing. This nest built about forty feet high, in an oak tree, was very untidy, matted inside with excrement and the scurfy exfoliation from the growing feathers of the youngsters, and encumbered with portions of several gophers. The nestlings were too young to make any resistance beyond a menacing hiss and a very mixed flapping when they were unceremoniously pitched out. The mother was shot near the nest with a pistol-ball, but her partner kept prudently out of the way. This bird had not reached her mature plumage. The young had been well cared for; their crops were full of gopher-meat at the time, and they were very fat.

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* "*Gopher*": Frontier vernacular name for all the ground-squirrels (*Spermophili*) indiscriminately. *S. tridecem-lineatus* is the commonest kind here. The pouched rats are known as "pocket-gophers."

In July, I had a live young one in captivity, at about the age of these two; and early in August, I possessed a completely feathered and full grown bird of the year, probably hatched in May. This shows that either two broods are reared, or that the laying season runs through most of the summer. This grown young one made rather an acceptable capture for some days, as he was trim and shapely, with a fine eye and general military bearing, as well as an excellent appetite. But then he was bad-tempered, took the most civil advances unkindly, and would not even fraternize with a pair of very well disposed and sensible owls that were picketed with him. At last, when he so totally failed to appreciate his position as to use his claws with painful effect, he was summarily executed. Both this and the younger one before him had a peculiarly plaintive whistle to signify hunger or a sense of loneliness, a note that was almost musical in intonation. This was the only cry I heard from them; the old birds have the harsh loud scream, much alike in all our large hawks.

The quarry of Swainson's buzzard is of a very humble nature. I never saw one stoop upon a wild-fowl or grouse, and though they probably strike rabbits, like the red-tails, their prey is ordinarily nothing larger than gophers. Though really strong and sufficiently fierce birds, they lack the "snap" of the falcons and asturs; and I scarcely think they are smart enough to catch birds very often. I saw one make the attempt on a lark-bunting. The hawk poised in the air, at a height of about twenty yards, for fully a minute, fell heavily with an awkward thrust of the talons—and missed; the little bird slipped off badly scared no doubt, but unhurt, while the enemy flapped away sulkily, very likely to prowl around a gopher-hole for his dinner, or take potluck at grasshoppers. They procure gophers, mice and other small quadrupeds both by waiting patiently at the mouth of the holes, ready to claw out the unlucky animals the moment they show their noses, and by sailing low over the ground to pick up such as they may find away from home. But I question whether, after all, insects do not furnish their principal subsistence. Those that I shot after midsummer all had their craws stuffed with grasshoppers. These insects, which appear sometimes in almost inconceivable numbers, seem to be the natural source of supply for a variety of animals. Wolves, foxes, badgers, and even the rodents, like gophers, supposed vegetarians, come down to them. Sandhill cranes stalk over the prairie to spear them by thousands. Wild-fowl waddle out of the reedy pools to scoop them up; we may kill scores of sharp-tailed grouse, in September, to find in every one of them a mass of grasshoppers, only leavened with a few grubs, beetles leaves, berries and succulent tops of plants. It is amusing to see a hawk catching grasshoppers; skipping about "like a hen on a hot gridiron," in an awkward way, and looking as if he were rather ashamed of being seen in such a low performance. Food being so abundant and easily procured, the birds become extremely fat early in the autumn, and lazy withal. Unaccustomed to the presence of man in these regions, they may be approached with little difficulty as they perch on the trees, and often fly unwittingly within short range. When brought down winged they show no lack of spirit, and must be prudently dealt with, as their talons are very effective weapons of defence.

Changes of plumage with age affect more particularly the under parts, the back, wings and tail being more nearly alike at all times.

Young-of-the-year (both sexes). Entire upper parts dark brown, everywhere varied with tawny edgings of the individual feathers. The younger the bird, the more marked this variegation; it corresponds in tints closely with the color of the under parts, being palest in very young examples.

Under parts, including lining of wings, nearly uniform fawn-color (pale dull yellowish-brown), thickly and sharply marked with blackish-brown. These large dark spots, for the most part circular or guttiform, crowd across the fore breast, scatter on the middle belly, enlarge to cross-bars on the flanks, become broad arrowheads on the lower belly and tibiæ, and are wanting on the throat, which is only marked with a sharp narrow blackish pencilling along the median line. Quills brownish-black, the outer webs with an ashy shade, the inner webs toward the base grayish, paler and marbled with white, and also showing obscure dark cross-bars; their shafts black on top, nearly white underneath. Tail feathers like the quills, but more decidedly shaded with ashy or slate gray, and tipped with whitish: their numerous dark cross-bars show more plainly than those of the quills, but are not so evident as they are in the old birds.

Adults (either sex). Upper parts dark brown, very variable in shade according to season or wear of the feathers, varied with paler brown, grayish or even reddish brown edgings of the feathers, but without the clear fawn color of the young: the feathers of the crown showing whitish when disturbed, and usually sharp dark shaft lines; the upper tail coverts chestnut and white with blackish bars. Quills and tail feathers as before, but the inner webs of the former showing more decided dark cross-bars upon a lighter marbled-whitish ground; and the latter having broader and sharper dark wavy bars. These large quills, particularly those of the tail, vary much in shade according to wear, the new feathers being strongly slate-colored, the old ones plain dark brown. The tail, however, never shows any trace of the rich chestnut that obtains in the adult *B. borealis*. *Male:* Under parts showing a broad pectoral area of bright chestnut, usually with a glaucous cast and displaying sharp black shaft lines; this area contrasting sharply with the pure white throat. Other under parts white, more or less tinged and varied, according to age, with light chestnut. In the oldest males, this chestnut is diminished to traces, chiefly in flank-bars and arrowheads, and the white throat is immaculate; in less mature examples, throat shows blackish pencilling, and the rest of the under parts are so much marked with chestnut, chiefly in cross-bars, that this color predominates over the white, and appears in direct continuation of the pectoral area itself. Some feathers of this area are commonly dark brown. *Female:* Much darker underneath than the male; throat pure white, but other under parts probably never whitening decidedly. Pectoral from rich dark chestnut or mahogany color, mixed with still darker feathers, to brownish-black, and other under parts heavily marked with chestnut, chiefly in cross-bars alternating with whitish, but on the flanks, and sometimes across the belly, these markings are quite blackish. The general tone of the under parts may be quite as dark as the pectoral area of the male; but it lacks uniformity, and the increased depth of color of the pectoral area in this case suffices to preserve the strong contrast already mentioned.